



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11) EP 0 911 597 A2

EUROPEAN PATENT APPLICATION

(43) Date of publication:
28.04.1999 Bulletin 1999/17

(51) Int. Cl.⁶: F28D 7/00, F28F 1/02

(21) Application number: 98118536.6

(22) Date of filing: 30.09.1998

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE
Designated Extension States:
AL LT LV MK RO SI

(72) Inventors:
• Guerra, Marco
20129 Milano (IT)
• Guerra, Benito
24100 Bergamo (IT)

(30) Priority: 22.10.1997 IT MI972380

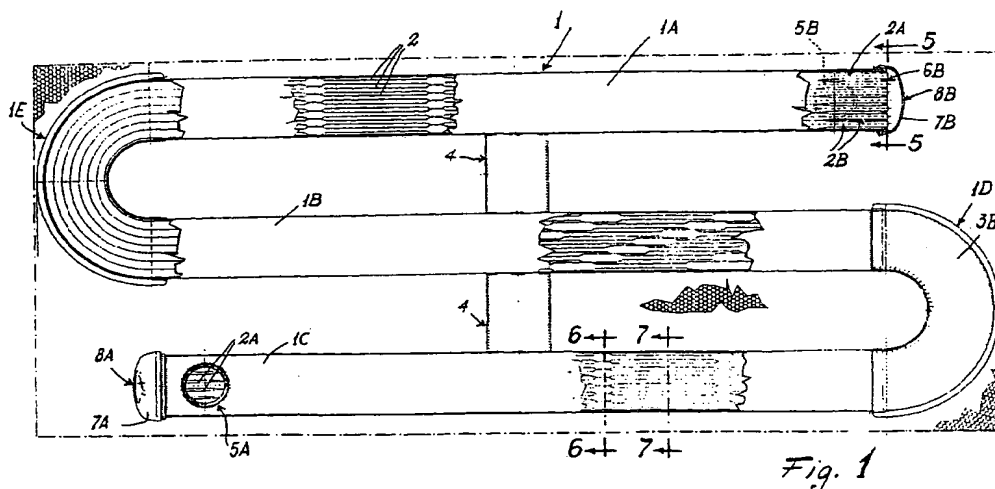
(74) Representative:
Kratter, Carlo, Dr. Ing. et al
Ing. A. Giambrocono & C. s.r.l.
Via Rosolino Pilo 19 b
20129 Milano (IT)

(71) Applicant:
FIN ROBUR S.A.P.A. di BENITO GUERRA & C.
24121 BERGAMO BG (IT)

(54) Heat exchanger

(57) A heat exchanger of the type comprising a substantially tube-shaped casing (1) with an inlet (5B) and an outlet (5A) for a first fluid, and a plurality of tubes (2) arranged longitudinally in the interior of said casing (1); each tube is connected to an entry element (7A) and an exit element (7B) for a second fluid, the first fluid flowing through the casing (1) in contact with the outer surfaces

of said tubes; the tubes (2) within the casing (1) are substantially directly in contact with each other and with the inner walls (11) of said casing and have a cross-section such as to form within the casing (1) a plurality of micro-channels (10), parallel to the tubes (2), for the flow of the first fluid.



EP 0 911 597 A2



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 98 11 8536

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cls)
X	DE 32 09 760 A (AKTIEBOLAGET THERMIA-VERKEN) 4 November 1982 (1982-11-04) * page 7, line 17 - page 8, line 27 * * page 11, line 29 - page 13, line 2; figures 1A-6A *	1,2,12	F28D7/00 F28F1/02
Y	—	5,8,9 10	
A	—		
Y	US 4 884 629 A (BRONNERT) 5 December 1989 (1989-12-05) * abstract; figure 1 *	5	
Y	US 5 251 693 A (ZIFFERER) 12 October 1993 (1993-10-12) * abstract; figure 1 *	8,9	
X	FR 1 406 867 A (SULZER FRERES S.A.) 24 November 1965 (1965-11-24) * page 2, right-hand column, line 36 - page 3, left-hand column, line 42; figures 1-3 *	1,2	
A	DE 20 55 820 A (NENNINGER) 21 September 1972 (1972-09-21) * the whole document *	1,2	TECHNICAL FIELDS SEARCHED (Int.Cls) F28D F28F
A	DE 297 09 136 U (VIESSMANN WERKE GMBH) 24 July 1997 (1997-07-24) * the whole document *	1	
A	US 2 346 822 A (CLANCY) 18 April 1944 (1944-04-18) * page 1, right-hand column, line 52 - page 2, right-hand column, line 24; figures 1-4 *	1	
	— -/-		
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 30 March 2000	Examiner Beltzung, F
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

EPO FORM 1503 03/82 (P04C01)



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 98 11 8536

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	AT 400 365 B (FERCHER) 27 December 1995 (1995-12-27) * page 3, line 6 - line 48; figures 1,5 *	1-3	
A	WO 84 00207 A (AB ZANDER & INGESTRÖM) 19 January 1984 (1984-01-19) * the whole document *	1	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
Place of search THE HAGUE		Date of completion of the search 30 March 2000	Examiner Beltzung, F
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons</p> <p>& : member of the same patent family, corresponding document</p>			

EPO FORM 1503 03.92 (P/MC01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 98 11 8536

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

30-03-2000

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 3209760 A	04-11-1982	SE 441303 B CA 1178268 A DK 114482 A,B, SE 8101767 A	23-09-1985 20-11-1984 21-09-1982 21-09-1982
US 4884629 A	05-12-1989	NONE	
US 5251693 A	12-10-1993	NONE	
FR 1406867 A	24-11-1965	NONE	
DE 2055820 A	21-09-1972	NONE	
DE 29709136 U	24-07-1997	NONE	
US 2346822 A	18-04-1944	NONE	
AT 400365 B	27-12-1995	AT 207093 A	15-04-1995
WO 8400207 A	19-01-1984	DK 112584 A EP 0112366 A FI 840796 A JP 4017350 B JP 59501171 T NO 840755 A US 4589481 A	28-02-1984 04-07-1984 28-02-1984 25-03-1992 05-07-1984 28-02-1984 20-05-1986